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ABSTRACT

The aim of the project was to develop automated systems encompassing the functions of existing manual procedures, but only when the functions could also be surpassed sufficiently to justify the cost of automation. The housekeeping systems were to be viewed as a whole and appropriate interfaces provided between them so as to provide an integrated series of systems. Improving the reader's subject approach to the collections took priority in the automation process. A joint project was undertaken with Southampton whose priorities were concentration on loans, MARC tape utilization, and an order system. It was agreed to make the systems developed as integrated and usable to other libraries as possible. (SJ)

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DEVELOPMENT AND TESTING OF AUTOMATED LIBRARY PROCESSES:

REPORT ON OSTI-SUPPORTED PROJECT, APRIL 1968 TO MARCH 1971.

SUMMARY

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1. INTRODUCTION

The history of the project dates back to 1966, when it was envisaged that this Library should develop an automated systems approach. While it was considered highly desirable to participate in automated information retrieval research, the 'housekeeping' processes were regarded as a necessary foundation. The aim was to achieve optimal rather than maximal automation, that is, to develop automated systems encompassing the functions of present manual systems, but only when these functions could also be surpassed sufficiently to justify the cost of automation. At the same time, the housekeeping systems were to be viewed as a whole and appropriate interfaces provided between them so as to provide an integrated series of systems.

Southampton were found to have similar interests. They had already gone some way towards automating the loans system, and had plans for an order system, as well as a desire to experiment with reader-utility of differing forms of catalogue. Loughborough's priorities were concerned with improving the reader's subject approach to the collections, hence a start had already been made with the Alphabetical Subject Index (section 2) and the plans for periodicals involved more detailed subject indexing of normal title coverage than may be found elsewhere.

A joint project was therefore formulated with Southampton concentrating on loans, MARC tape utilisation and an order system, and Loughborough developing the systems described herein. It was agreed that, as far as possible, each Library would test or at least theoretically evaluate the other's systems in order to help ensure the utility of the work to other libraries as well as hopefully to achieve an integrated series of systems.

It was also agreed to make the programs as widely usable as possible by using Cobol. Southampton have found it necessary to turn largely to ICL Plan in programming their systems to achieve the desired efficiency of operation. Loughborough's systems are almost entirely in Cobol: this will continue to be the major language for 'housekeeping' systems but some standard ICL utility programs are necessarily used.

Progress reports, as short statements of the achievements or difficulties of the periods concerned, have been issued by both Loughborough and Southampton, and liaison has been greatly assisted by the attendance of OSTI meetings. The purpose of the present document is to survey the work done during the years 1968 to 1971, as an official report to OSTI on Loughborough activities.

2. ALPHABETICAL SUBJECT INDEX

Up to 1966, the alphabetical subject index (ASI) to the Dewey classified catalogue was, like the catalogue itself, on cards and occupied about eight drawers of the catalogue. It was only possible for one person at a time to consult the index, that is, without taking drawers out of the catalogue. It was necessary for the cataloguers to leave their office and come out into the entrance hall to check the state of the index and create new entries as required. At that time the only 'authority list' was a master copy of Dewey held by the cataloguers, with the schedules marked with pencilled notes to show policy.

It was considered desirable to increase reader and staff access, and to make it possible for each cataloguer to have his own copy of both an ASI and a corresponding authority list in numerical order of class numbers. The card entries were at that time in normal chain index form, that is specific term, successively more generic or context terms, and class number for the specific term. Although there was no official limit placed upon the number of context terms, it was found upon study of the entries that the maximum used so far was eight. More important, it was also found that reduction to a maximum of three terms per entry - specific term plus two context terms - could be achieved easily without semantic loss, by selecting the more significant terms.

A simple fixed field system was therefore conceived as the Library's first venture in automation, using punched cards for input. The first computer programs were prepared by the Computer Centre in Fortran using standard sorts. There was unfortunate delay in getting the data base

on to magnetic tape, however, and the print-outs produced during 1966 and 1967 were achieved by reading in the total pack of about 8,000 punched cards. Termly print-outs were used and are still found satisfactory.

The ASI was included in the OSTI project proposal for the following reasons :

(a) magnetic tape file creation was thought essential before the system could be offered to other libraries, as well as desirable for continued operation at Loughborough

(b) similarly, it was considered that the programs should be re-written in Cobol to facilitate use by other libraries, and the Computer Centre at that period had neither the time nor the Cobol expertise to offer

(c) it was decided that the system should be made more sophisticated in terms of sort routines, and also in preparation for later link-up with automated cataloguing to allow the print-out of subject bibliographies.

Soon after the OSTI project was under way in 1968, the system was put on to magnetic tape and updating achieved by reading in 'addition' and 'deletion' cards only. Subsequently, the programs were re-written in Cobol, the system being made more efficient in the process, and the Systems Manager also conducted some research into sort routines.

Originally the input had specifically excluded hyphens and punctuation. The new sort routines, while employing ICL utility program #XSMC, allow the use of punctuation and also permit accurate sort of numerals, for the computer creates a 'sort-part' for each record which is different from the 'print-part', and the latter consists of data exactly as input apart from the insertion of spaces.

Otherwise, there has been no change in the input. The limitation to three terms - one specific plus two context - has been found quite

satisfactory throughout the five years of operation. It should be borne in mind that each index entry has to be intellectually generated. In theory, one could automatically generate the context terms, but in practice this would mean :

(i) an often unnecessarily long string of terms;

(ii) the use of variable length field system in consequence;

(iii) the inclusion of a number of meaningless terms, since Dewey numbers tend to be assigned to concepts like 'other', for example.

Consequently, it is envisaged that input will always be intellectually generated.

With regard to the space allotted to each term, namely 21 characters, this has been found adequate so far, and allows each 'addition' or 'deletion' card to contain one full entry which results in either alphabetical print-out for the ASI or numerical print-out by class number for the authority list. The allowance of 11 characters (including point) for DC number has also been found adequate so far.

Whether these fixed fields will always prove adequate is a question currently under consideration. However, a program still required is that which was envisaged for link-up with automated cataloguing to allow the print-out of subject bibliographies. It is also considered that such a program is desirable to permit the production of 'special-area' ASI's, either of DC as used for the main collection or of special, deeper, retrieval systems. This implies a program capable of selecting all entries commencing with, for example, DC 62 ... Since the requirements are similar to certain of the requirements of the new Interdisciplinary Information Studies project (1971 to 1974), the question has been left for study in conjunction with that project. It may also be found necessary either to extend the fixed field allowances or make the fields variable length, though at present it is thought that mere extension would be sufficient.

An incidental use of the ASI was for the indication of DC numbers undergoing re-classification. Up to 1966, the classification policy in the Library had included certain variants and certain UDC segments. In 1966, it was decided to standardise on DC 17th edition, and the work of re-classification was done by the cataloguers up to 1968. During this time, an asterisk appeared in the ASI and authority list against each number which had been assessed in the re-classification work.

The present situation is that two copies of the ASI are displayed for reader use, and each of four cataloguers has his own ASI plus authority list, and this situation is quite satisfactory for general purposes. Relevant segments of the Systems Manager's documentation, including data punching form, work description, flowchart, program list, notes on sorting studies, data input instructions, master file structure, and specimen print-outs, appear in Appendix A. The system can be made available to other libraries wishing to use it.

3. PERIODICALS DATA SYSTEM

In June 1967, LUT/LIB/R3 was issued as a preliminary report (ref. 1). The purpose of that document was to outline the proposed system and to define requirements sufficiently to permit data collection to commence, and the system design of that time did in fact prove adequate for data collection. The preliminary report was superseded by the first - and, at present, the only - official report produced during the OSTI project, issued as LUT/LIB/R4 (ref. 2) in March 1969.

3.1 Aims

The Periodicals Data System (PDS) was conceived as a total system covering the various cataloguing, handling, and administrative record requirements of serials. 'Total system', however, is intended to encompass optimal rather than maximal mechanisation. There were, and still are, some serials processes which did not appear capable of efficient automation. In the case of binding preparation, for example, for which some American systems summarise automated accessions data and

produce lists of volumes ostensibly ready for binding, little point was seen in following suit, for the final arbiter is in any event the actual shelf state of a given set. Instead, provision was made for 'binding check list' print-out of titles (only) which may have volumes ready for binding, as judged by the computer record of normal receipt months of title pages, contents and/or indexes (or alternatively months preferred for given titles), the check lists being intended to help the staff in consulting the shelves for binding preparation and also to signal the need for ordering indexes individually. Similarly, although an interface was provided for the future automation of serials accessions, it was considered that the only means then available for such automation were too cumbersome compared with a manual 'visible index' system (such as "Kardex") using telescopic signals to indicate the need for claims. More will be said about automated serials accession in section 4 below. Circulation, in the sense of passing on periodicals regularly from person to person, was also omitted as being of little importance to universities, but it was envisaged that a subsystem could easily be interfaced if required, and since then an interesting periodicals circulation system has been developed in industry (ref. 3).

Apart from those provisos, PDS was then the most comprehensive U.K. scheme, and its logical future was seen as national-level use with local libraries using such modules or subsets as they might require. It was intended to make provision for union listing, but no work was done on this part of the system, for it was thought necessary to design and operate the main elements of the system first.

The optimal rather than maximal approach constituted the first difference between PDS and systems overseas. The second difference was the emphasis on improving the subject approach for library users, providing detailed subject indexing of the normal subject coverage of serial titles. The method of indexing is set out in LUT/LIB/R4 which, though out of print, is available on loan from the National Lending Library. A third difference was the provision for linking former and later titles in such a way as to allow the option of printing out full runs under latest title if desired, while giving earlier titles their individual entries plus reference right up to the latest titles.

The subject indexing method and 'historical links' were conceived in such a way as to permit automatic update and print-out of holdings or other listings without prior intellectual editing, and this in itself constitutes a fourth difference. The fifth and last difference was a 'unit entry' approach, in which each data element is considered as a unit and any combination of units can be achieved by program, thus eliminating the need for duplicating input in other forms or contexts. All these five differences or innovations in approach have been achieved in practice.

3.2 Development

PDS is necessarily a complex system. Studies carried out by the Systems Manager during 1968 indicated the desirability of first constructing an experimental fixed-field system, and the developmental stages were envisaged as follows :

Stage 1 (a) production for reader use of first holdings list, comprising title section with selected data and sponsoring body index, and first subject index;

(b) production of first 'staff-only' lists of all data in the system;

(c) input of all data elements excluding binding, 'wants', and subscription/order data. (Certain other data elements are also excluded from LUT input as they are provided for use by other universities: for example, LUT use 'country' but not 'place' of publication. The programs, however, cover all elements allowed for in the system).

Stage 2 (a) input of binding data and production of binding check-lists for the staff;

(b) input of subscription data and production of order schedules and financial statistics;

(c) conversion of entire system to a variable-field format.

Stage 3 (a) input of 'wants' data and production of 'wants' lists;

(b) provision of automated accessioning, should a suitable subsystem be devised, and interfacing it with the 'wants' subsystem;

(c) program refinement or sophistication, for example the production of special subject and other listings;

(d) costing of the entire system;

(e) experimental holdings list preparation for other universities;

(f) liaison with BUCOP and possible use of the system by them.

Serious programming staff difficulties were encountered during 1968 and 1969. Despite these difficulties, however, keypunching of cards for the collected data was achieved and by March 1969 the file was put on to magnetic tape. Print-out requirements had been decided during 1968 and various trial print-outs were made during 1969 and early 1970. Some of the trials were required to determine the holdings list layout required for photo-reduced duplication by Rank-Xerox Ltd., and by mid-1970 the master print-outs were sent to that company. By that time, twelve generations of the master file had been produced. In the autumn of 1970, copies of the photo-reduced holdings list (ref. 4) and subject index (ref. 5) were made available to university departments and to external

organisations. Since then, some residual data errors have been detected and corrected and some further program refinements achieved.

It should be noted that the Systems Manager arrived at two fundamental improvements in the original concepts, as well as managing to complete the system to holdings list stage despite the shortage of programming aid. The first of these concerns Coden. It was first thought necessary to have a unique title identifier as well as an 'alphabetical sequence number', particularly for linking former and later titles. Coden were chosen because they were at that time gaining ground and Standard Serial Numbers had not been envisaged. The Systems Manager designed a program capable of changing reference or 'alphabetical sequence' numbers throughout the file, irrespective of complexity of context, thus making it possible to expand the base of the alphabetical sequence number wherever it might appear. Hence there was no point in using Coden for historical links and the alphabetical sequence number became the sole file identifier. Secondly, it was originally envisaged that the complex retrieval process required for historical links could only be achieved economically with disk. In response to a request from Southampton, the Systems Manager sought a tape solution and this proved quite difficult to render efficient. The final tape solution now takes seven passes of the tape and is reasonably efficient compared with disk (number of passes depends upon maximum number of title change links per title on file). A disk solution is also available and is the one most often used by LUT, for it encompasses print requirements as well within the same program, whereas the tape solution requires three programs (selection, completion, and print).

Meanwhile, the Library of Congress issued their MARC Serials Format (ref. 6) in August 1969, though copies were not received until the spring of 1970. The emergence of that document has influenced subsequent policy in respect of conversion of PDS to variable length, as recounted in section 4 below. In fact, it is probably just as well that PDS was developed on a fixed field basis which, albeit experimental, is proving quite satisfactory in operation.

3.3 Status

The present status of PDS is that stage 1 has been completed. Selected parts of the Systems Manager's documentation appear in Appendix B. A complete 'user instruction manual' will be prepared as part of the Extension Project (section 8 below) and PDS will be made available as a Cobol package suitable for the preparation of holdings lists, sponsoring body lists, detailed subject indexes, and the other print-outs mentioned in Appendix B. It should be noted that the input sheet and flowcharts therein supersede those in LUT/LIB/R4.

Further development in accordance with the original stages 2 and 3 will only take place in conversion to a MASS subset as mentioned below. The independent development of a more comprehensive and variable field PDS will be dropped, though it will be possible, for those who may so desire, to apply the MINICS (section 5) file creation programs to an integrated subset of MARC and local fields.

4. MARC-BASED AUTOMATED SERIALS SYSTEM

4.1 Aims

MASS is a system under development, employing mostly variable length fields. The prime aim of MASS is to provide data element compatibility both ways with the MARC Serials Format, thereby constituting a system allowing the sharing of data to produce national or area union lists, as well as individual library holdings lists or subject indexes.

The second aim is to record information of local utility, such as binding, ordering, subscriptions and similar data, hopefully serving as a total system - as far as this may be feasible or desirable - for the administration of serials collections as well as for their cataloguing.

The third aim is to allow maximum flexibility for other libraries, and this has been perhaps the most difficult. The co-operating group has been kept as small as possible in order quickly to achieve a design

for a working scheme, yet the endeavour has been made to construct a framework suitable for all libraries.

The design has arisen from collaboration between LUT and the Birmingham Libraries Co-operative Mechanisation Project (BLCMP).

4.2 Development

BLCMP had shown considerable interest in Loughborough PDS development, but their principal concern was union listing capability and this, as remarked in section 3, was not a PDS priority. In June 1970, BLCMP were well advanced with plans to use a subset of the MARC monographs format for their books union catalogue covering Birmingham Public Library and the Universities of Aston and Birmingham. Hence the new MARC format offered BLCMP the basis for a file format similar to that already chosen for their monographs system. Loughborough also evaluated the MARC Serials Format, and recognised that a system designed to exchange serials data at national level should have compatibility both ways with MARC. (This is quite different from LUT approach in the monographs area, where the Minimal Input Cataloguing System is a local-file structure very much simpler than MARC and compatible with it only in one direction - MARC to MINICS). Unlike the monographs situation where central cataloguing is in any event practised, union lists of serials require the cross-feeding of cataloguing data as well as the interchange of information on the particular holdings of each library. Therefore both BLCMP and Loughborough reached the conclusion that the optimal manner of achieving compatibility was to use a subset of MARC itself, plus a number of fields for local use only which are not provided for in MARC. In June 1970, intensive co-operation began between BLCMP and Loughborough to agree the computer file format, the MARC subset, and the local data element content. The result was the jointly produced document of reference 7.

The decisions on data element content and definition have involved liaison with the Library of Congress, and some of the variants proposed are still under discussion, particularly those involving the linking of fields and records, or unit data treatment, for the MARC system as it stands requires duplication of input in some areas such as the 400's

fields on 'series statements' and the 800 to 840 fields on 'series added entries', whereas MASS will generate these items by program from the piecemeal data concerned. However, while such fields do not appear in the MARC subset incorporated into MASS by courtesy of the Library of Congress, there is no constraint which would preclude anyone from using the whole of LC/MARC within the MASS format.

The capability of producing union lists was fundamental to the whole MASS project. In order to provide such capability, as well as include local data not covered by MARC, and yet not exceed the machine limitation on the length of an individual item record, BLCMP evolved the following generalised framework for files of cataloguing data for any kind of publication for the three Birmingham libraries concerned :

MARC record (subset of fields)	)
local record, Library 1 and/or	) for each item
local record, Library 2 and/or	)
local record, Library 3	)

LUT having agreed to this general framework, the details were worked out in collaboration, and the principles upon which the Loughborough experimental PDS is based were built into MASS. It is a quite full and complex system, and Loughborough's main motive in collaboration was hopefully to assist in the design of a system potentially capable of national application: that is, sufficiently detailed for national or international bibliographic services, thereby reducing or eliminating the local need for 'cataloguing'-type data preparation for a serials system. MASS has, in both the 'General' and 'Local' segments, fixed field codes followed by variable length fields, and hence can be applied minimally - say, title and shelf location only - or maximally.

4.3 Related Activities

(a) National Libraries ADP Study

The Study team at Bath University have worked out, initially with LUT and later also with the SCONUL Working Party on Acquisitions and Serials Automation, a 'minimal subset' of MASS for national union listing

purposes. The proposed subset will be discussed within SCONUL, and a decision should be made regarding the optimum method of preparing a national union catalogue with minimum duplication of cataloguing effort. The object in selecting fields for the subset was to include only those data which are commonly needed for exchange of information purposes: hence, for example, only the fields relevant to holding library, the form and state of actual holdings, and whether the title is available for loan, have been selected from the 'Local' segment of MASS. The ADP Study team are of course not only concerned with union listing, but also with the varied and complex requirements of the individual national libraries.

(b) Standard Serial Numbers (SSN) and Automated Accession

Following closely on the heels of Standard Book Numbers came an American proposal, resulting in a draft standard currently before ISO/TC 46, for SSN - or rather, as they have now become, International Standard Serial Numbers (ISSN). A British Standards Institution Panel (of OC/20/8), on which LUT is represented, has studied the proposal and contributed suggestions, and this Panel includes publishers' and agents' representatives as well as librarians. It has emerged clearly that, certainly as far as the U.K. is concerned, ISSN would be welcomed. Representatives of British serials publishers believe that the inception of ISSN and their use on the covers of every serial issue could be fairly rapid once agreement has been reached on the standard, but it has been emphasised that they must be assured that the standard is a permanent one. It is also desirable that publishers should include volume, part and date in a standard format alongside the ISSN, so there is still some way to go. It is to be hoped, however, that an international standard for ISSN will be approved before the year is out, for the use of these unique identifying numbers for each title is fundamental to further progress with co-operative serials systems, and especially automated systems employing mechanised accession methods.

It should be noted that, as part of the contribution to MASS, Loughborough will redouble their efforts to devise a suitable means of automating accessions.

(c) International Serials Data System

In April 1970 two members of INSPEC submitted a feasibility report on an 'International Serials Data System' (ISDS) to the UNISIST/ICSU-AB Working Group on Bibliographic Descriptions (ref. 8). That document includes a full analysis of the possible nature of ISSN, but its main aim, of course, was to describe a possible overall system. International agreement on the need for an ISDS was rapidly reached, and there are now plans for its establishment in Paris.

Following a meeting at the British National Bibliography headquarters early this year, copies of the first MASS document have been passed on to Paris for consideration for the ISDS.

MASS has the necessary capability for application in an ISDS, but there is plenty of room for discussion and comment at detailed level. It would seem possible, however, that MASS may be found useful at least as a basis for ISDS. It is highly desirable to use a common cataloguing standard - or a reconcilable series of standards - to achieve the aims implicit in ISDS. In reference 8 the system was conceived as containing minimal data, but it is possible that a full system could be very valuable permitting special listings across national boundaries or of material in particular languages or on particular subjects. Those countries which are able, or become able, to support national bibliographic systems including serials could operate a fully detailed union listing system updated fairly frequently. The ISDS could receive and co-ordinate only the cataloguing portion (MASS 'General') of such national updatings, but operate on a longer publication cycle in respect of hard copy output.

4.4 Loughborough Policy

It would seem possible that MASS, or a minimal subset of it, could at least form the basis of the ISDS. Assuming the development in any event of a detailed national U.K. system, there remains the interim period to consider. When a suitable 'minimal subset' of MASS for national union cataloguing has been agreed with SCONUL, Loughborough considers that - as far as MASS 'General' or cataloguing data are concerned - libraries

proposing to use MASS would be well advised to confine themselves to the minimal subset data elements until the structure of the ISDS file is defined. The MASS 'General' elements included in the present minimal subset should give no 'semantic equivalence' problems, no matter what structure may be adopted for ISDS. Libraries could, of course, use as much of the MASS 'Local' elements as they wish, as long as the minimal subset local elements are included.

This policy would not, however, reduce the necessity for continuance of MASS development by BLCMP and LUT, since the file creation and other programs would in any event be required for the subsets. As far as Loughborough is concerned, PDS will continue to be used until the national minimal subset is agreed, whereupon conversion to a variable field system will take place. Whether such conversion will utilise a MASS subset, or the MINICS file format with added (and MASS-equivalent) fields to give a single integrated file of general-plus-local data, is still under consideration. With regard to area union listing, Loughborough aims are similar to Birmingham's in respect of nearby college libraries and possibly also neighbouring universities.

5. MINIMAL-INPUT CATALOGUING SYSTEM

5.1 Aims

MINICS is being developed in the hope of fulfilling three principal purposes by means of a common system structure:

(a) Cataloguing It should be possible to catalogue any kind of record with this system, including audio-visual aids. The data element content as at present defined, however, excludes 'local'-type periodicals requirements such as subscriptions, etc., because of the separate PDS and the later MASS. The content is nevertheless completely flexible and the file creation programs can cope with whatever additional fields may be required.

As it is a variable length system, it can of course be operated minimally or maximally, so that libraries wishing to input only author's surname, title and date could do so. A certain number of data elements have been included merely to meet the possible needs of other libraries.

The main aim has been to produce a 'local file' structure simpler than MARC, but allowing the transfer and incorporation of data from MARC if desired. The opportunity has been taken to include provision for material not at present covered in MARC such as research reports. MINICS also allows analytical cataloguing and, to preserve the principle of 'unit data element' treatment as a common feature of all LUT systems, this is achieved by using the presence of an analytical item number '06 Article no.' to change the relevance of other fields. In fact, all but two fields are then interpreted as relevant only to the analytical item, those two being links with the record for the parent item. The needs of union catalogues have also been borne in mind.

(b) Bulletins, printed catalogues, and catalogue cards Provision for the preparation of accessions bulletins is an obvious necessity. Printed catalogues will be an option, but LUT will avoid them (except for special-purpose listings) at least until such time as computer filing rules problems have been solved at national level, and will instead produce catalogue cards for monographic items. Further details appear below under 'Reports and Papers' and 'Books'.

(c) Information retrieval The needs of special retrieval systems have been particularly borne in mind. Analytical cataloguing has already been mentioned in (a) above. Provision is being made for considerable flexibility in subject indexing.

It should therefore be possible to use MINICS for either broad-area current awareness bulletins or specific SDI, as well as for co-ordinate search via classification schemes or subject descriptors.

5.2 Development

MINICS evolved from earlier consideration of the problems of automated cataloguing of research and other reports, pamphlets and individual papers, especially when these items form part of a series and are to some extent already traceable in abstracts. In the original OSTI project proposal, these items were called 'Source Sequence', reflecting the physical arrangement of uncatalogued items first by country, then source organisation, then series and number, for such was the shelf organisation of the LUT collection at that time.

Such items have now been termed 'Reports and Papers'. A simpler treatment than full cataloguing was considered desirable on economic grounds because, although Reports and Papers can have high specific information value, they are liable to have a quite low ratio of usage to size of collection. Also, as already remarked, some are quite well indexed by abstracting services.

However, MINICS is no longer limited to Reports and Papers, and there are now two cycles of operation for the common file structure, both cycles being accessions/current awareness bulletin-oriented :

(a) Reports and Papers (RP). These are items in series, other than books in a series. The local logic exercised in segregating the stock is outside the scope of this document. What matters is that, if a series entry is required for anything other than a periodical, the series entry goes into RP. If the item is also a report or pamphlet member of a series, the details of the individual item go into RP as well, and the item is physically located in the RP collection.

It was considered that the need to inform readers what has arrived, as well as record and retrieve references, might be obtained with minimal effort by the following procedure. The only 'catalogue' as such for RP is the accessions bulletin. Each monthly issue will contain entries arranged first by broad bulletin class number, next by series title (via a series identifier number) and random within. The entries in each bulletin will be numbered sequentially with a 'bulletin number', which will thenceforth be the only link with the name and subject indexes. Although the indexes will cumulate, the bulletins will not. In short, the publication pattern will be similar in principle to that of certain abstracting journals.

Physical shelf arrangement is of course a matter for individual library preference, but LUT have re-arranged Reports and Papers first by series classification - a fairly broad one, but hopefully assisting 'browsing' capability - and then by source organisation, series and number within series.

(b) Books (B). This really means books or individual monographs, or pamphlets/reports not in a series. Again, the first task is accessions bulletin preparation, items being arranged by broad bulletin class number and then by actual shelf class number. Items will not be given a running bulletin number.

Continuous stationery catalogue cards will then be produced for manual filing, the filing being assisted by rough pre-sort before print-out.

Despite the simplicity of MINICS compared with MARC, the file format adheres closely to that of MARC. There are, however, two significant format differences: firstly, there are no subfields in MINICS, only a 'field divider' allowing repeat of a field, such as a number of subject descriptors, and the divider only goes in if there are more than one;

secondly, the fixed field portion of MINICS is strictly confined to data elements that may be regarded as truly fixed. Although the Preliminary Report (ref. 9) lists, for example, the MARC physical form codes under '10 Physical form code', this was merely provisional. In actual fact that field, along with almost all the others, is variable length and hence adaptable for any purpose. Incidentally, the original intention expressed in reference 9 to use a fixed length directory has been dropped and the directory is now variable length.

5.3 Status

Programming of the RP cycle is almost complete, and selected items from the Systems Manager's documentation are given as Appendix C. The RP cycle experimentally follows the INSPEC internal tape procedure, hence the master file is arranged in the same way as the bulletin, common information such as bulletin class number or series title being picked up (for each individual item record) from the 'batch headers'. This makes it possible to minimise the input of data for items in series, for 'series identifier number' can be input to represent all data relevant to the series as a whole. The use of the INSPEC batched file arrangement allows this 'minimal input' without resort to look-up procedures which would otherwise be necessary.

The Books, etc., cycle has not yet been specified. It will be necessary for this to receive early attention for the new Interdisciplinary Information Studies project, for MINICS will be used for the Particle Science and Technology Information Service system which will serve as the model for that project. At that time, it is believed worthy of consideration for the Books and RP input to be treated by a single suite of programs down at least to master file update stage, by first creating an 'in-process' file capable of manipulation. In respect of RP, this would mean completing individual records with series data obtained by look-up of a series data tape. However, since it is desirable anyway to have the facility of printing out RP series titles from a general serials file which also includes periodicals, this procedure may prove worthwhile.

It should be noted that the information included in Appendix C supersedes reference 9 in several aspects. That Appendix includes an example of the proposed RP subject index, and this is indicative of LUT's first choice for experimentation, out of the various possibilities indicated in the Preliminary Report.

6. UTILISATION OF SOUTHAMPTON WORK

As stated in the Introduction, one of the aims of this three-year project was to arrive at an integrated series of systems, jointly with Southampton, with each testing and later utilising the other's work as far as possible. There has been full liaison and exchange of information during the period, but in practice the extent of cross-utilisation has so far been small. Southampton are interested in MINICS and MASS and have to some extent utilised Loughborough ASI work as a model for their own LC-based index. The state of Loughborough utilisation of Southampton work is as follows.

6.1 MARC tapes

The ICL tapes produced by Southampton have been used regularly to test the programs, with varying degrees of success according to the stages of program development. Little attempt has been made to do other than test the programs in view of involvement with other matters, and this limitation was agreed with OSTI. However, whole tapes have been successfully copied, fields and subfields have been selected, fixed-length records created, and selected SBN printed. Some errors were found that others may not have discovered, such as program stoppage when trying to select a field or sub-field which happened to be absent from the tape. Close liaison on errors was maintained with Southampton.

6.2 Circulation system

It was recognised at the outset that, in view of equipment considerations, LUT could only evaluate the Southampton loans or circulation system in theory, and this was done. One basic policy difference, however, was the use of

copy numbers as well as accession numbers at LUT mainly to provide for a future reservation process, whereas the Southampton accession number is unique to a volume and not to a title.

LUT are currently investigating the need to automate loans. The equipment situation has changed since Southampton commenced work, and there are possibilities of using machine-readable labels which remain fixed in the books - this type of system, should it be proved feasible, would be LUT's preference. Even so, it should prove possible to utilise much of Southampton's software, but for Loughborough these considerations are outside the OSTI project and will not utilise OSTI funds.

6.3 Acquisitions system

It is understood that the system may be ready by summer 1971 and LUT are awaiting the final package. Adjustments have been made by Southampton to allow compatibility with the 'order data' archive "tail" of the LUT MINICS form of record. Subject to theoretical evaluation of the package when it becomes available, LUT are considering running the Southampton system experimentally, alongside the existing manual system, before deciding upon full adoption.

7. EXTENSION PROJECT

The period commences in 1971 and closes in 1974. Unlike the 1968 - 1971 joint project, this applies to Loughborough alone, but co-operation with other interested libraries would, of course, continue to be welcomed.

The Extension Project will be supervised by Dr. A. J. Evans, University Librarian, assisted by: R. A. Wall, Deputy Librarian; D. C. Hogg, Computer Centre Manager; and P. J. Lloyd of the Chemical Engineering Department. The research team comprises Mr. M. E. Robinson as Systems Manager, Mr. P. M. Linn as Information Officer, two Programmers (Mrs. D. Yamanaka and Mrs. M. Perry), and two Clerical Assistants.

There are in fact two component projects in the extension period, for which some £39,000 has been made available by OSTI. The first is a continuation of the work reported herein on MINICS and MASS, and making PDS available as a holdings list/subject index preparation package; this is for two years to 1973.

Interdisciplinary Information Studies

The second component project is now, and will be, the main focus of endeavour during the period. It will involve experimentation with the merging of information from and between magnetic tape abstracts services, with particular reference to the interdisciplinary requirements of a model retrieval system.

The Chemical Engineering Department of this University has in recent years established the Particle Science and Technology Information Service. This is at present a manual system providing current awareness bulletins and retrospective retrieval service in an interdisciplinary subject area. During the past seven years the Chemical Engineering Department's Particle Technology Group have established strong international links, especially with the principal centres in the U.S.A., the Commonwealth and continental Europe. These links have led to arrangements for the exchange or supply of data.

Although the Particle Science and Technology Information Service does not in itself form part of this research project, the Service will be used as a model during the experimental period. It is considered that the subjects represent a suitable example of an interdisciplinary area. As soon as the Library's programs for MINICS (Minimal-Input Cataloguing System) are ready, within the first year of the project, it is proposed to use the automated MINICS procedures for the Particle Science and Technology Information Service. Magnetic tapes may then be made available as part of that Service, but initially it is planned to develop automated current awareness bulletins, SDI and automated retrospective retrieval.

It is proposed to experiment with the automated feeding of information into the Particle Science and Technology Information Service from as many as possible of the following taped abstracts services: UKCIS (CAC);

INSPEC; Nuclear Science Abstracts; MEDLARS; USGRDR; Metals Abstracts; and COMPENDEX (ENG. INDEX). (Others are under consideration).

This may be done either by obtaining full tapes or subset tapes of group profiles. Such subsets will be determined in terms of the particular abstracting system. In MEDLARS, for example, this would entail firstly the preparation of a group profile of terms from the thesaurus to cover Particle Science and Technology, and secondly the incorporation of these terms in the Particle thesaurus with links to existing terms and identifying symbols to show system origin. During the first year of the project, only specimen tapes will be required from the various services. From January 1972, however, either the full tapes or subset tapes will be required regularly.

The research aims may be summarised as :

(a) study of physical tape compatibility problems;

(b) investigation of cross-equivalence of indexing terms between the thesauri, and linking methods;

(c) study of the effects of varying and search logic applicable in the different tape services;

(d) costing studies;

(e) assessment of success of cross-feeding the information;

(f) attempts to estimate the possible need for a national vocabulary centre providing cross-linking between the various thesauri and eventually including as many natural language terms as possible.

The indexing problems of (b) above arise not only from the use of different levels of terms and of synonyms, but of different overlap of terms and the way in which they are interlinked. Assessment, (e) above, would be achieved partly by comparing the results of alternative profiles of (c); partly by the continuation by the Particle Technology Group of the indexing of journals covered, for example, by UKCIS, then comparing the UKCIS subset for those journals with the Group's product; and partly by specimen searches.

8. COMPUTER FACILITIES AND LIBRARY EQUIPMENT

During most of the period the computer configuration was an ICL 1905. This has been upgraded in 1970 to an ICL 1904A, with the addition of shared core with Nottingham and later Warwick. The link with Nottingham has been provided; the one with Warwick is expected to be operational after October 1971.

The ICL 1904A configuration at Loughborough comprises the following: 128 K; 4 x 40 Kc/s MT; 4 x 8M EDA; Magnetic drum; 1 x 900 c.p.m. card reader; 1 x 300 c.p.m. card reader; 1 x 1000 c.p.s. paper tape reader; 1 x 110 c.p.s. paper tape punch; multiplexor with remote terminal unit, including 1 x 75 c.p.m. card reader and 1 x 75 l.p.m. printer, and two teletypewriters.

The Library has an ICL 068 card keypunch which, after three years of hire, has been purchased out of Library funds. In addition to the Ultronic tape-typewriter held at the beginning of the grant period, a Friden tape-typewriter was also added. Both tape-typewriters have full ISO coding for upper and lower case text input. The University's Telex terminal is located in the Library, and may in time prove useful for remote linkage to on-line abstracting services. It is also hoped that an interrogating console (with the University's Computer Centre) will be installed in the coming year.

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